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Army

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*PROJECT
CORONA*

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Army review(s) completed.

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Operational Reports Control

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Time	Report	Title	Reason for Report
Each Friday		Weekly Status	To keep Hqs informed on the long range status (estimated launch dates).
L-14 days		Ephemeris Data	To provide Hqs with ground track and other data necessary to establish camera on-off points.
L-10 days		Program Data	To furnish LMSD with data to cut program tape (camera on-off points). Data may be furnished for more than one tape.
L-5 days		Daily Status	To keep Hqs informed on the immediate capability to launch. Report required every day from L-5 days until launch.
L-3 days		Mission Data	To inform LMSD of camera settings and film type to be used. Also to select final camera on-off points to use.
L-30 hours		Mission Plan	To inform LMSD of Hqs decision to delay or continue the launch based on Weather in target area. To provide LMSD with optimum launch time and earliest and latest time of day launch could occur and give sufficient sunlight for photography.
L-8 hours		Recovery Wx	To provide Hqs with forecast of Wx in Recovery area
L-6 hours		Go-No-Go	To inform LMSD of final Hqs decision to launch or delay based on target weather.
L-2 hours		Special Status	To keep Hqs informed of status of vehicle during pre-launch countdown. Report submitted each hour until launch or abort.
L+10 min		Launch Report	To inform Hqs that launch has occurred.
L+2 hrs		Progress Report	To inform Hqs of success of launch and preliminary data.
L+20 hrs		Progress Report	To provide Hqs with actual ground track of satellite and estimated recovery time.
ASAP		Flash Recovery	To inform Hqs of the recovery of the capsule and brief description of condition.
ASAP		Take Report	To inform Hqs of ETA of take at West Coast and condition of take.
As Occurs		Abort Report	To inform Hqs of a delay requiring postponement of launch until next day or longer.
As Occurs		Crash Report	To inform Hqs of a mishap to a vehicle involving loss of life, injury or destruction of property.

This document contains information
referring to Project **CORONA**

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Code
 — ground track
 — camera on-off points and width of camera coverage
 Number - pass number

Priority I Target Areas

Highest Targets (Red)

Under 55°	Over 55°	Cn 55°
20	16	2

High Targets

Under 55°	Over 55°
402	116

Mission 9002, Launch date
 Orbital Period
 Apogee Altitude
 Perigee Altitude
 Average Altitude Target Area
 Total Flight Line Coverage

540 statute miles
 160 statute miles
 11,000 nm

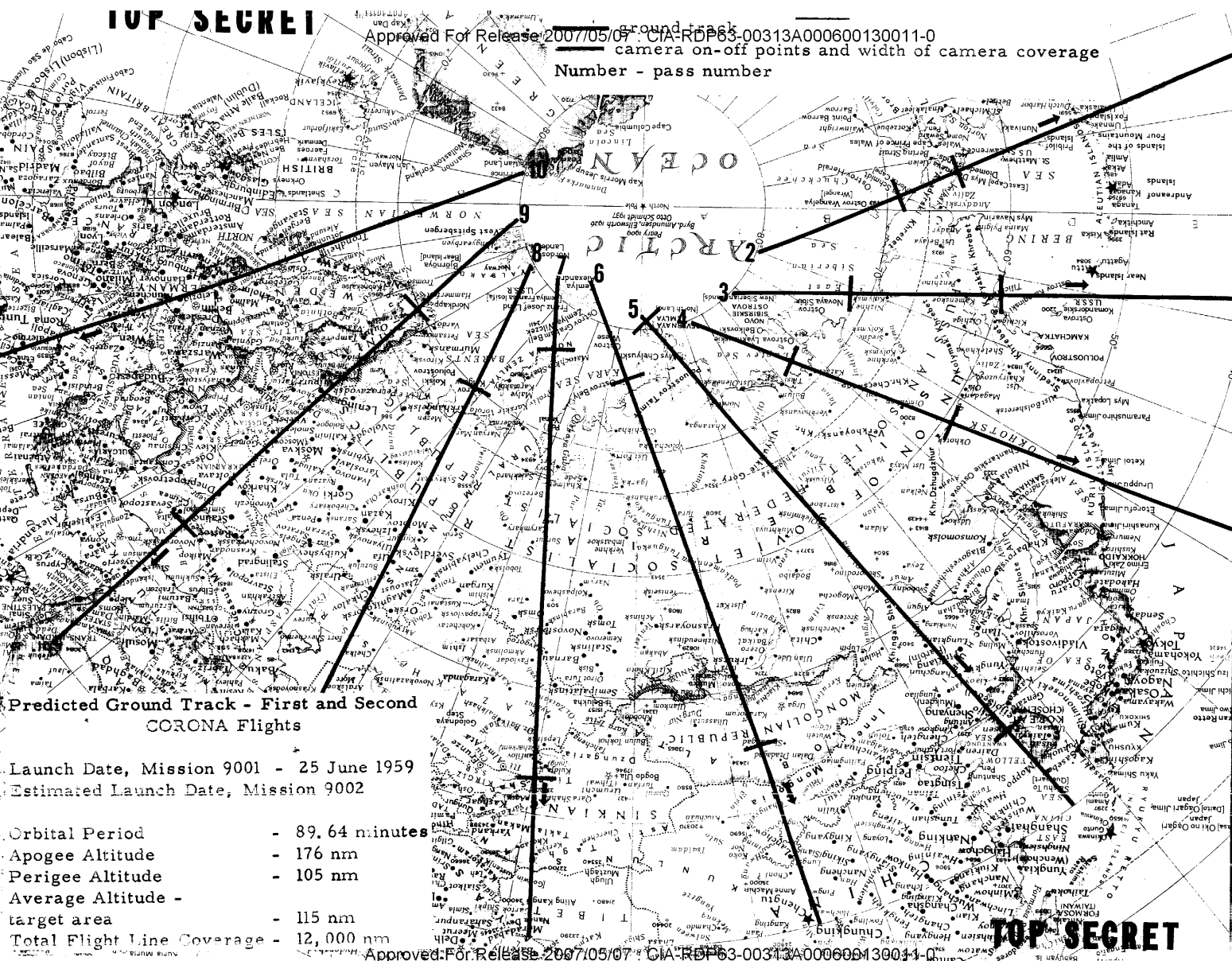
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camera on-off points and width of camera coverage

Number - pass number



Chronological Sequence of Events - CORONA Test Vehicle #3
April 1959

Date/Time	Event
13/1800Z	Estimated time of launch of test vehicle #3.
1 April L-12 days	Receipt by Headquarters of Ephemeris Data (from this ground track of the vehicle is obtained), recommended camera settings and film type.
2 April L-11 days	Headquarters determined camera on and off points considering intelligence requirements, film supply, and climatology.
8/2100Z L-5 days	Headquarters received first of daily status reports on vehicle with latest estimated time of launch (ETL).
10/2000Z L-72 hours	Headquarters considered and approved recommended camera settings and film type.
12/1200Z L-30 hours	Headquarters considered weather in target area (best weather to date - 4000 nm flight lines in 3/8 or less cloud cover). Headquarters also determined earliest and latest time of day launch could occur and give sufficient sunlight for photography.
13/1200Z L-6 hours	Headquarters took final look at weather (2500 nm flight lines in 3/8 or less cloud cover).
13/1600Z L-2 hours	Receipt by Headquarters of first of hourly status reports giving latest ETL and reasons for delays.
13/1700-2100Z	Receipt by Headquarters of several launch delays caused primarily by weather at the launch site.
13/2200Z L-42 minutes	Receipt of launch report. Successful launch at 2118Z. Vehicle definitely in orbit.
13/2318Z L-12 hours	Receipt by Headquarters of first post launch status report. Vehicle in polar orbit. Orbital time approximately 3 minutes less than planned. Vehicle under control.

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14/1818Z
L121 hours

Receipt of special status report indicating command control of vehicle has been lost. Recovery operation cancelled due to capsule impact predicted in area 500 miles north of Spitzberg Islands at 15/0018Z.

14/2118Z
L124 hours

Receipt of second status report. Orbital time 90.5 minutes vs. 94.5 minutes predicted. Actual ephemeris indicates each pass falls successively further to the East of predicted path.

15/2000Z
L147 hours

Receipt of special status report. The VAFB tracked vehicle and received telemetry on pass 24 and 25. Good data with positive indication of capsule separation. On the 26th pass, no telemetry received indicating batteries dead. Also unconfirmed report of flash in sky followed by report of parachute descending in Spitzberg Island area. Air Force investigating.

16 April

Brief post mortem. Launch was successful with vehicle going into polar orbit of shorter duration than anticipated. Vehicle was stabilized, command control initially established and the capsule did separate. Separation occurred at wrong time because the programmer could not be changed from predicted to the actual α bit time. Programmer was over-controlled by Hawaiian tracking station in an attempt to adjust to difference in actual vs. predicted orbital time. An automatic feature of the programmer causes it to slip back to the predicted time when so over-controlled. Since programmer is set to receive commands only during certain times, command control was not achieved again because when the vehicle was in range of our ground stations, the programmer would not accept the signals. (Results of programmer operating on predicted, not actual, time.) Based on the predicted time the programmer automatically orders the recovery process to commence resulting in capsule release in the wrong area. A review of actual weather conditions over the target area during orbital time indicated 3000 nm of flight lines with 3/8 or less cloud cover. From a photo reconnaissance standpoint, correct programmer timing being achieved and recovery accomplished, this would have been considered a successful mission.

Chronological Sequence of Events
CORONA Mission 9001 - June 59

Date/Time	Event
20 May L- 33 days	Receipt by Headquarters of ephemeris date (Ground Track)
22 May L- 35 days	Selection of film type and camera setting, camera on off points, and launch time limits by Headquarters. Info dispatched to Palo Alto.
19 June L- 5 days	Headquarters received 1st Daily Status with ETL of 23/1800Z (launch set for earliest time authorized by Headquarters.)
22/1500Z L- 30 hours	Headquarters considered target weather (3800NM of flight lines in 3/8 or less cloud cover.)
23/1200Z L- 6 hours	Headquarters took final look at weather (3200NM of flight lines in 3/8 or less with good possibility of small areas opening in Urals and Western Russia) Approval Sent.
23/1500Z	Back up weather (for launch on 24th). Considered - Weather had deteriorated.
23/1700Z	Receipt of [] (Status Report) - Holding at L minus 95 minutes because range safety line out - Vehicle condition excellent.
23/1800 to 1900Z	Receipt of several [] indicating still holding for range safety lines.
23/1950Z	Receipt of [] (Abort Report). Launch rescheduled to 25/1800Z. Reason given was range safety lines out and 48 hours required for repair - necessary rescheduling and notification at Headquarters was performed.
24/1500Z	Considered target weather (2000NM in 3/8 or less).
24/2100Z	Daily Status Report received reconfirming ETL on 25/1800Z.

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Date/Time	Event	
25/1200Z	Considered final weather - some improvement over forecast made on 24th - 2400 NM in 3/8 or less - probability of additional small areas in Central and North Central USSR.	
25/1700Z	Receipt of indicating now ETL of 25/1900Z because of minor technical delays - Launch prospects excellent.	25X1
25/1800Z	Series of holds caused by small technical problems, pressurization, fueling problems and beacon problems.	
25/2250Z	Launch occurred with initial data indicating a successful launch.	
26/0110Z L plus 2:20	1st Progress Report indicated vehicle probably did not go into orbit.	
26/0240Z 1 plus 4:00	2nd Progress Report indicated definite failure of vehicle to go into orbit.	
26 June	Brief post mortem - Exact reason for failure to orbit unknown at this time. Departure azimuth 4 degrees west of planned which would decrease boost given by rotation of earth. THOR trajectory was lower than nominal. Insertion velocity was 25,605 Ft/sec. vs 25,691 Ft planned. Actual weather in target area would have permitted 3500NM of photography.	

14/1818Z
L121 hours

Receipt of special status report indicating command control of vehicle has been lost. Recovery operation cancelled due to capsule impact predicted in area 500 miles north of Spitzberg Islands at 15/0018Z.

14/2118Z
L124 hours

Receipt of second status report. Orbital time 90.5 minutes vs. 94.5 minutes predicted. Actual ephemeris indicates each pass falls successively further to the East of predicted path.

15/2000Z
L147 hours

Receipt of special status report. The VAFB tracked vehicle and received telemetry on pass 24 and 25. Good data with positive indication of capsule separation. On the 26th pass, no telemetry received indicating batteries dead. Also unconfirmed report [redacted] of flash in sky followed by report of parachute descending in Spitzberg Island area. Air Force investigating.

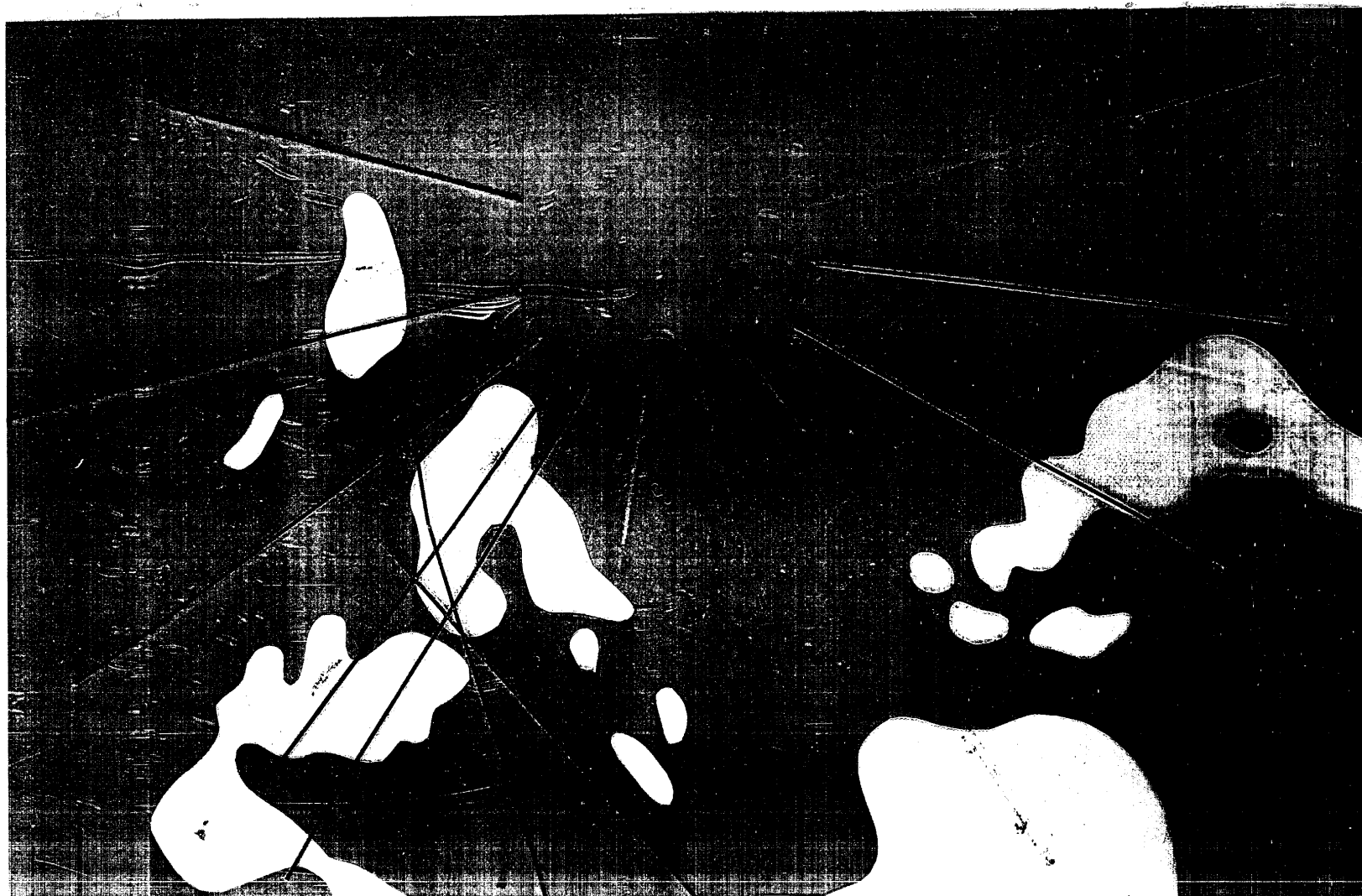
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Continued

Date/Time	Event	
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25/1700Z	Receipt of indicating now ETL of 25/1900Z because of minor technical delays - Launch prospects excellent.	25X1
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Actual Track - Test Shot #3

Actual time of Launch	13 April 2118Z
Actual Orbital Period	90.5 minutes
Estimated Impact Point	500 miles north of Spitsbergen Islands

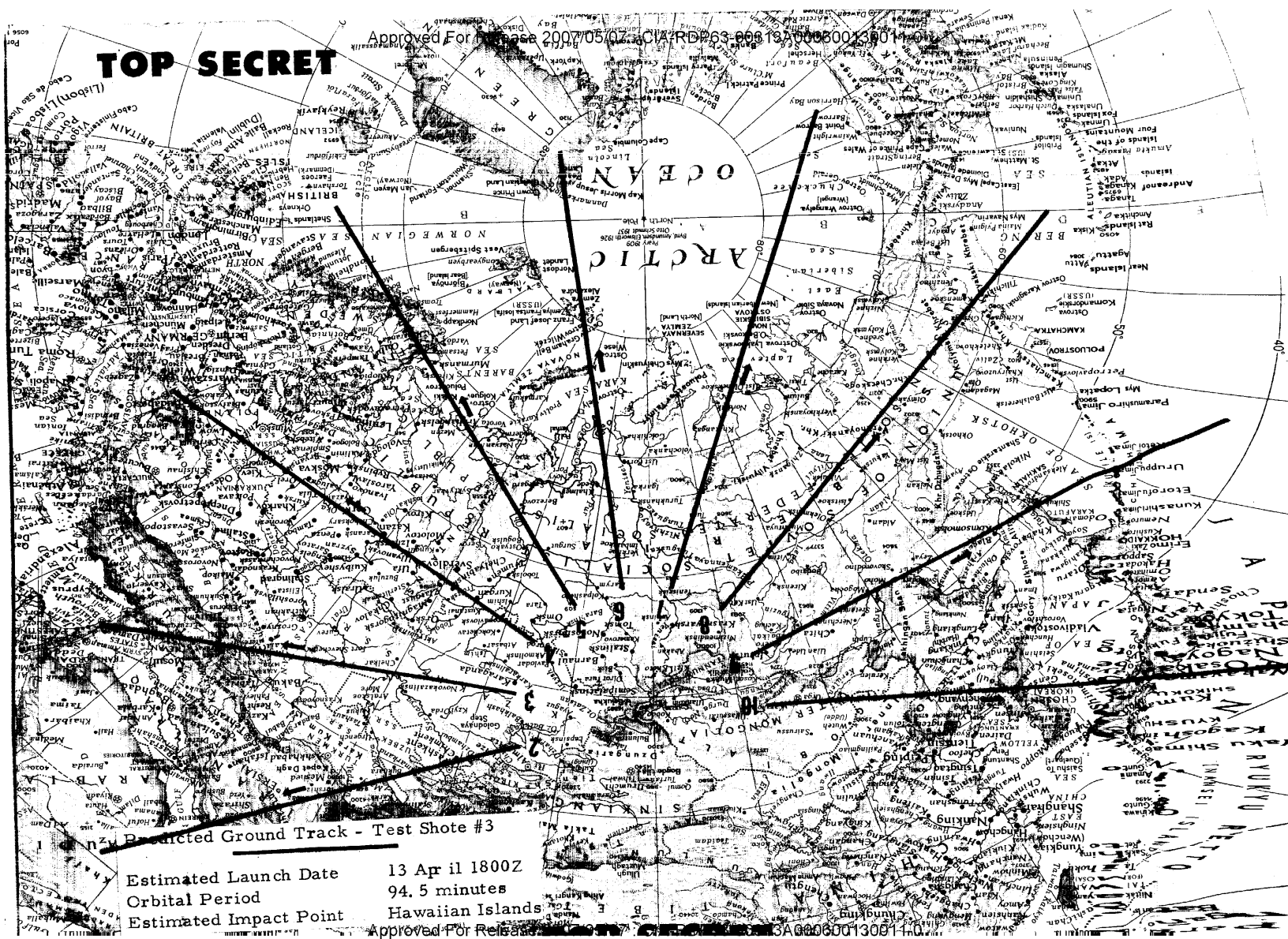


Actual Weather Conditions

Clear areas represent areas of 3/8 or less
cloud cover during the period of orbit of
test shot #3

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Time of Year Limitations on Project CORONA

Factors

1. Vehicle in one day polar orbit.
2. USSR and European satellites considered only areas justifying CORONA coverage.
3. Concentration of priority areas between 50° and 60° N latitude.
4. Total vehicle linear flight line coverage in desired area equals 13,000 nm.
5. Film supply will provide for 12,000 linear miles of flight line.
6. Minimum acceptable sun altitude is 15°.
7. Weather variable but will reduce nm of flight lines open to photography by approximately 50%.

Limitations Imposed by Above Factors (except weather)

1. 3 April to 10 September - no limitations.
2. On 6 October and on 8 March - no photography above 70° N latitude - 9,000 nm flight lines available.
3. On 3 November and on 8 February - no photography above 60° N latitude - 5,000 nm flight lines available.
4. On 22 November and 22 January - no photography above 55° N latitude - 3,600 nm flight lines available.

Recommendations

1. The present schedule should be either contracted or expanded to preclude CORONA photo launches within period early November to mid-February.
2. Shift target areas to South, i. e., China, Tibet, Mongolia, Indo China.
3. Vary launch azimuth (inclination angle) to allow longer passes over USSR below 60° N latitude.
4. Use an alternate payload of interest to the Intelligence Community.
5. Use an alternate payload of scientific interest and useful in advancing our cover story.

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Priority I Target Areas

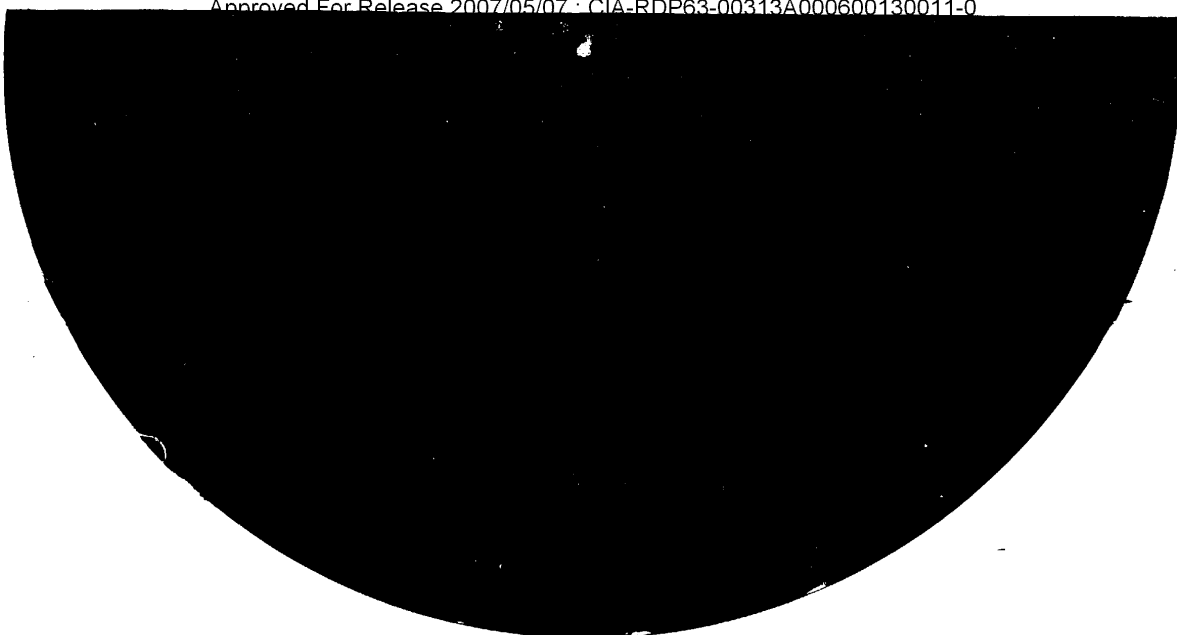


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November through February .
1300L

Clear areas have 3/10 or less cloud cover
at least 30% of the time

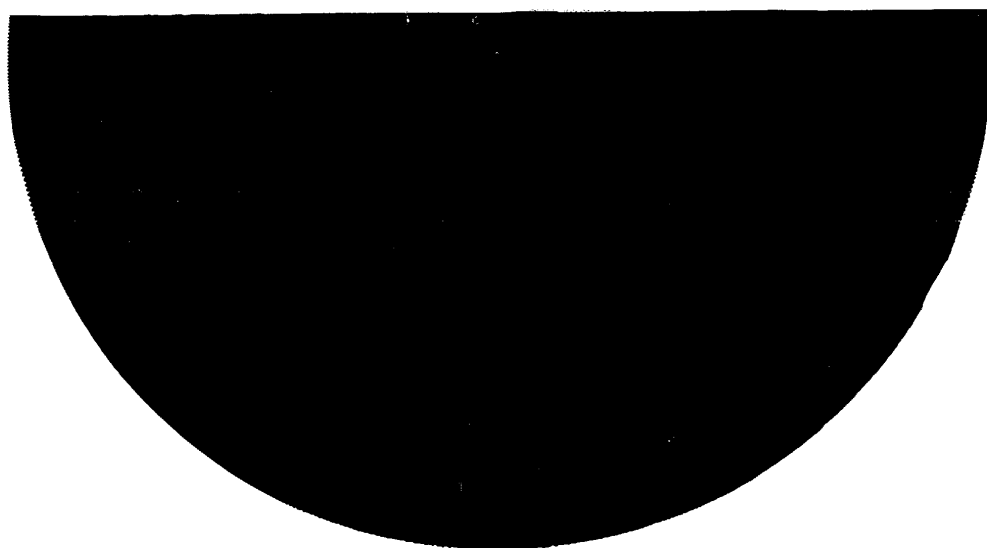
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55°

Area with sun below 15°
on 22 Nov and 22 Jan

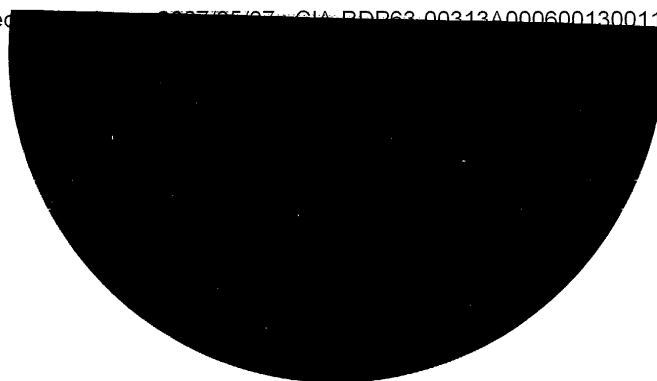
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60 °

Area with sun below 15°
on 3 Nov and 8 Feb

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70°

Area with sun below 15°
on 6 Oct and 8 March

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80°

Area with sun below 15°
on 10 Sept and 3 April

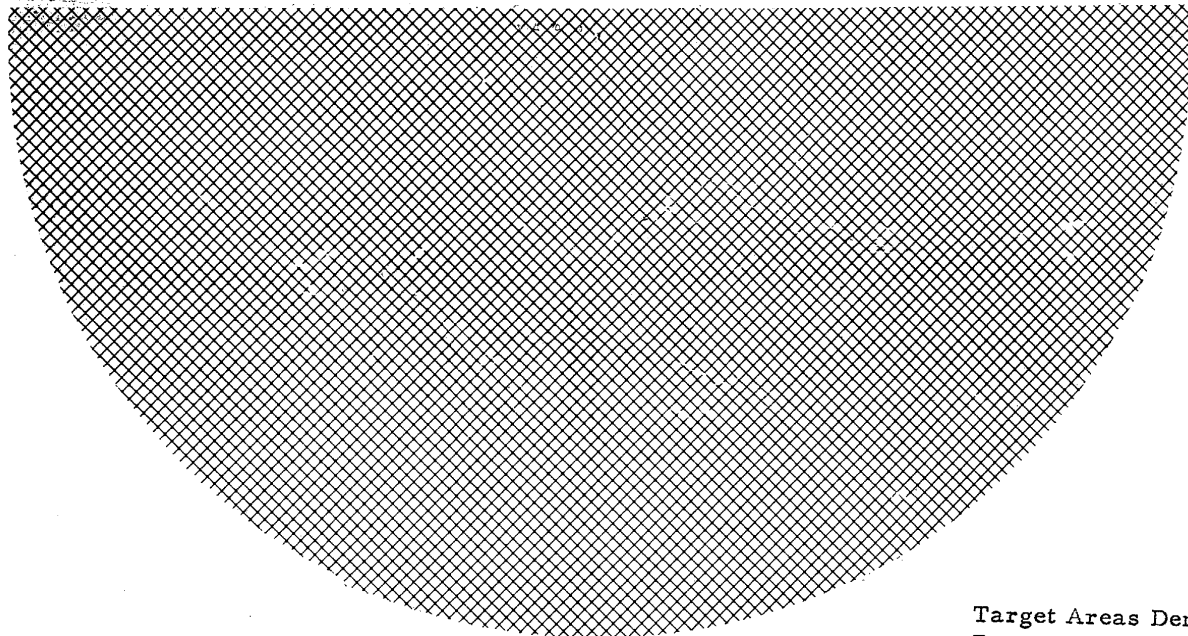
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Priority I Target Areas



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55°

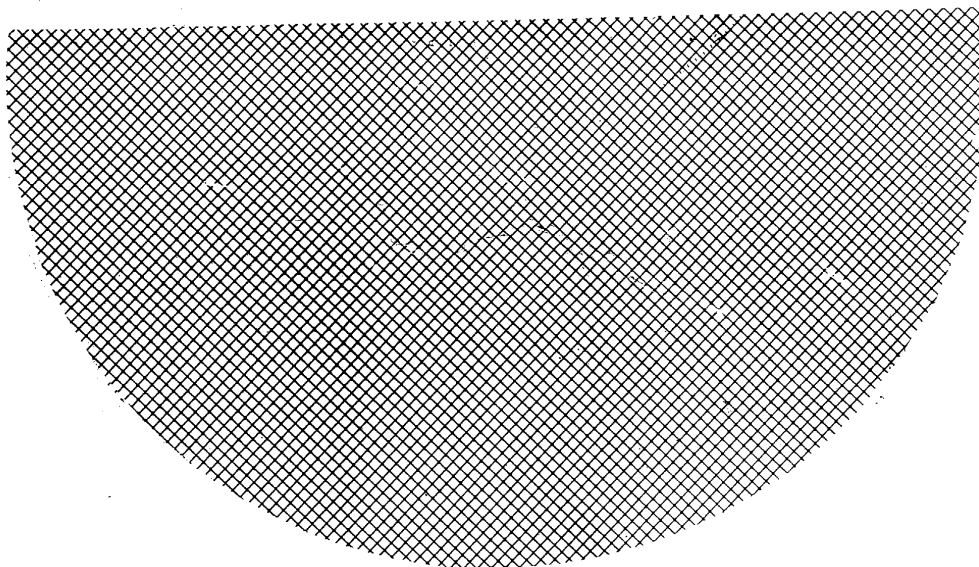
Target Areas Denied

Due to Sun Angle

1. Kola Peninsula
2. Molotovsk
3. Polyarnyy Urals
4. N. Portion of Urals
5. Moscow Complex
6. Kazan and Engels
7. Portion of Kuznets Basin

15° sun angle

Area with sun below 15°
on 22 Nov



60°

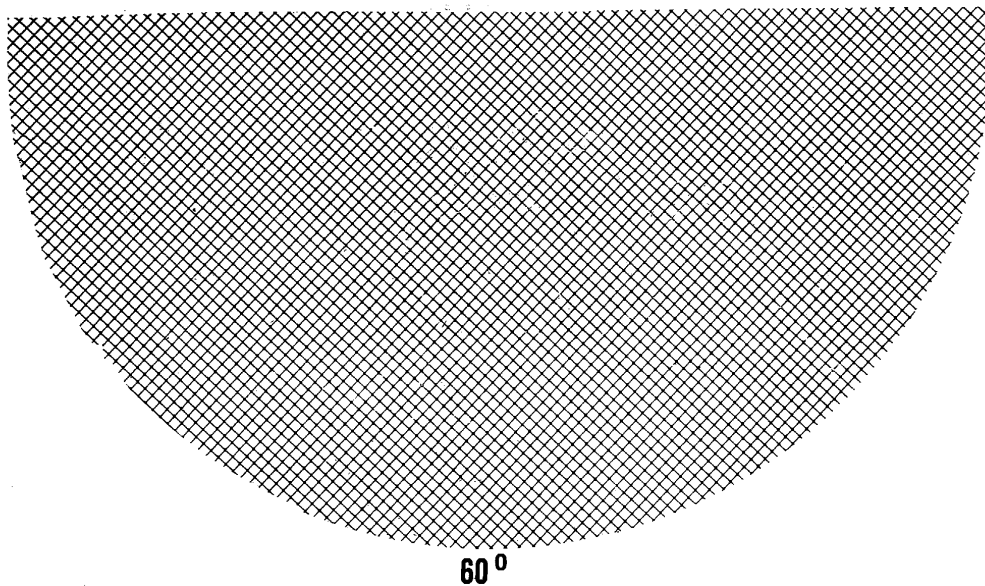
15° sun angle

Area with sun below 15°
on 26 Oct

Target Areas Denied
Due to Sun Angle

1. Kola Peninsula
2. Molotovsk
3. Polyarnyy Urals
4. Northern tip of Urals

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Target Areas Denied
Due to Sun Angles

1. Kola Peninsula
2. Molotovsk
3. Polyarnyy Urals
4. Northern tip of Urals

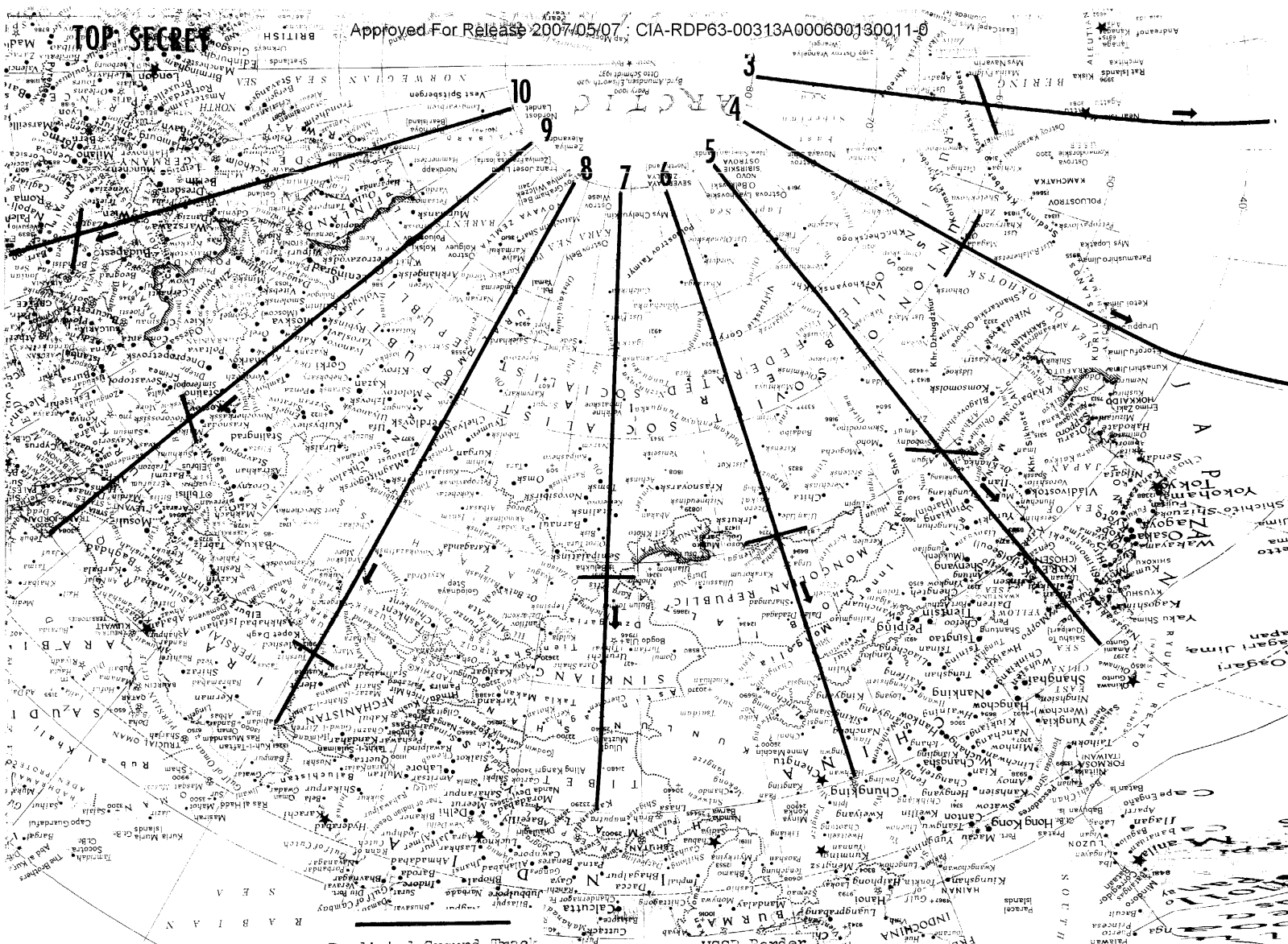
10° sun angle

Area with sun below 10°
on 12 Nov

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Predicted Ground Track
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